

# **EXHIBIT 4**



# Can dehydration cause creatinine to rise? If so, by what factor?

Post date: June 24, 2013

Dehydration does cause the serum creatinine to rise and the estimated glomerular filtration rate (eGFR) will, accordingly, fall. The degree of change is generally proportional to the degree of dehydration. Severe dehydration can actually cause acute kidney injury and may lead to a need for dialysis therapy.

- My blood creatinine of 1.60 mg/dL, age 72, male, diabetic with HbA1c of 5.5%. Does this indicate CKD and if so, what stage and what should I do? I live in Indonesia but am American.
- I had a UTI infection in April. I did not get better. I was ill had burning through out my body. Then treated for a kidney infection. They are calling my burning chronic pain? I am still being treated for kidney infection and then bladder 6 treatments since May? I have lost 22 pounds since May, still have burning, Strange bowel movements, swelling in groin, inner thigh and buttock?
- Are there any solutions for continued calf, ankle and foot swelling? My numbers are back to normal and I try to monitor salt intake, but it's been a year and they look awful. I also have very strong muscle cramps, sometimes in the groin area and some times the calf. I take magnesium and Co Q10 every day. I came off Prednisone 2 months ago and still get very achy joints and stiff muscles. Takes a few moments to get started after sitting for awhwile. My heart is good and I'm anxious to get back to working out without additional cramping! Have lost 11 lbs with 40 more to go.

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# Blood urea nitrogen (BUN) test

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A common blood test, the blood urea nitrogen (BUN) test reveals important information about how well your kidneys are working. A BUN test measures the amount of urea nitrogen that's in your blood.

Here's how your body typically forms and gets rid of urea nitrogen:

- Your liver produces ammonia — which contains nitrogen — after it breaks down proteins used by your body's cells.
- The nitrogen combines with other elements, such as carbon, hydrogen and oxygen, to form urea, which is a chemical waste product.
- The urea travels from your liver to your kidneys through your bloodstream.
- Healthy kidneys filter urea and remove other waste products from your blood.
- The filtered waste products leave your body through urine.

A BUN test can reveal whether your urea nitrogen levels are higher than normal, suggesting that your kidneys may not be working properly.

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You may need a BUN test:

- If your doctor suspects that you have kidney disease or damage
- If your kidney function needs to be evaluated, especially if you have a chronic condition such as diabetes or high blood pressure
- To help determine the effectiveness of dialysis treatment if you're receiving hemodialysis or peritoneal dialysis
- As part of a blood test group to help diagnose a number of other conditions, such as liver damage, urinary tract obstruction, congestive heart failure or gastrointestinal bleeding — although an abnormal BUN test result alone doesn't confirm any of these conditions

If kidney problems are the main concern, the creatinine levels in your blood will likely also be measured when your blood is tested for urea nitrogen levels. Creatinine is another waste product that healthy kidneys filter out of your body through urine. High levels of creatinine in your blood may be a sign of kidney damage.

Your doctor may also test how well your kidneys are removing waste from the blood. To do this, you may have a blood sample taken to calculate your estimated glomerular filtration rate (GFR). The GFR estimates the percentage of kidney function you have.

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## How you prepare

If your blood sample is being tested only for **BUN**, you can eat and drink normally before the test. If your blood sample will be used for additional tests, you may need to fast for a certain amount of time before the test. Your doctor will give you specific instructions.

## What you can expect

During the **BUN** test, a member of your health care team takes a sample of blood by inserting a needle into a vein in your arm. The blood sample is sent to a lab for analysis. You can return to your usual activities immediately.

## Results

Results of the **BUN** test are measured in milligrams per deciliter (mg/dL) in the United States and in millimoles per liter (mmol/L) internationally. In general, around 6 to 24 **mg/dL** (2.1 to 8.5 **mmol/L**) is considered normal.

But normal ranges may vary, depending on the reference range used by the lab and your age. Ask your doctor to explain your results.

Urea nitrogen levels tend to increase with age. Infants have lower levels than other people do, and the range in children varies.

Generally, a high **BUN** level means your kidneys aren't working well. But elevated **BUN** can also be due to:

- Dehydration, resulting from not drinking enough fluids or for other reasons
- Urinary tract obstruction
- Congestive heart failure or recent heart attack
- Gastrointestinal bleeding
- Shock
- Severe burns
- Certain medications, such as some antibiotics
- A high-protein diet

If kidney damage is a concern, ask your doctor what factors may be contributing to the damage and what steps you can take to try to control them.

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